

Division 3. Air Resources Board

Chapter 9. Off-Road Vehicles and Engines Pollution Control Devices

Article 4. Heavy-Duty Off-Road Diesel Cycle Engines

§ 2427. Engine Compliance and Quality-Audit Testing--New Heavy-Duty Off-Road Diesel Cycle Engines Selection, Evaluation, and Enforcement Action.

(a) Compliance Test Procedures.

(1) These procedures are applicable to, the 1996-1999 model year heavy-duty off-road compression-ignition engine family groups (as defined in Sections 3 and 11 of the 1996-1999 Heavy-Duty Test Procedures) or any subgroups within an engine family group selected for compliance testing pursuant to this section.

(2) The Executive Officer may, with respect to any new engine family group or subgroup being sold, offered for sale, or manufactured for sale in California, order an engine manufacturer to make available for compliance testing and/or inspection a reasonable number of engines, and may direct that the engines be delivered to the state board at the Haagen-Smit Laboratory, 9528 Telstar Avenue, El Monte, California or where specified by the Executive Officer. The Executive Officer may also, with respect to any new engine family group or subgroup being sold, offered for sale, or manufactured for sale in California, have a manufacturer compliance test and/or inspect a reasonable number of engines at the manufacturer's facility under the supervision of an ARB Enforcement Officer. Engines shall be representatively selected from sources specified by the Executive Officer according to a method approved by him/her, which insofar as practical shall exclude engines which would result in an unreasonable disruption of the manufacturer's distribution system. To the extent practical, the Executive Officer shall test a representative configuration (as defined in the 1996-1999 Heavy-Duty Test Procedures) from the engine family group in order to minimize manufacturers' expense and inconvenience in testing different engine configurations.

A subgroup of an engine family group may be selected for compliance testing only if the Executive Officer has reason to believe that the emissions characteristics of that subgroup are substantially in excess of the emissions of the engine family group as a whole.

(3) For all 1996-1999 heavy-duty off-road compression-ignition engines selected for compliance testing, the selection and testing of engines and the evaluation of data shall be made in accordance with the procedures set forth herein.

(4) For manufacturers that have more than one engine family group, the Air Resources Board or its designated laboratory shall procure and test at the manufacturer's expense no more than one engine family group per year, if compliance testing is required.

Notwithstanding the above, if a manufacturer fails to demonstrate compliance with the emission standards after one engine family group has been tested, the ARB or its designated laboratory may test additional engine family groups at the manufacturer's expense, until compliance is demonstrated on one engine family group or all of a manufacturer's engine family groups have been tested. However, the ARB may conduct engine enforcement testing pursuant to the engine test procedures specified in Section 2423, at its own expense. In such an instance, the Executive Officer shall order testing only in those cases where evidence such as quality audit test data or in-use test data indicate that engines may not be in compliance.

(5) All testing shall be conducted in accordance with the applicable model year certification emission test procedures. Break-in before testing may be performed on test engines to the same extent it is performed on assembly-line quality audit testing engines (See subsection (b)). No break-in or modifications, adjustments, or special preparation or maintenance will be allowed on engines chosen for compliance testing without the written consent of the Executive Officer. Such consent shall not be unreasonably withheld where such adjustment or alteration is required to render the engine testable and reasonably operative.

(6) If the manufacturer elects to specify a different break-in or adjustments, they will be performed by the manufacturer under the supervision of ARB personnel.

(7) Correction of damage or maladjustment which may reasonably be found to have resulted from shipment of the engine is permitted only after testing the engine, except where 100 percent of the manufacturer's production is given that inspection or maintenance by the manufacturer's own personnel. Exceptions are allowed in the cases where the damage results in the engine being unsafe to operate, inoperable, or unable to complete the emission test. Additionally, an exception is allowed if the damage results in engine performance deficiencies which would be obvious in customer service and which would cause the customer to seek repair of the engine. The manufacturer may request that the engine be repaired from shipping damage, and be retested. If the Executive Officer concurs, the engine may be retested, and the original test results may be replaced by the after-repair test results.

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(8) Engines shall be representatively chosen from the selected engine family group or subgroup. Manufacturers shall indicate which sampling plan (as described in paragraphs (9) and (10), below) they prefer to use prior to the start of testing. Once testing has begun, manufacturers may not switch to the other sampling plan; the generated test results will be final. Each chosen engine shall be tested according to the 1996-1999 Heavy-Duty Test Procedures to determine its emissions. Unique specialty hardware and personnel normally necessary to prepare the engine for the performance of the test as set forth in the applicable test procedures shall be supplied by the manufacturer within seven days after request. Failure to supply this unique specialty hardware or personnel may not be used by the manufacturer as a cause for invalidation of the subsequent tests.

(9) Primary Sampling Plan.

(A) Engines shall be tested in groups of five until a "Pass" or "Fail" decision is reached for each pollutant independently for the engine family group or subgroup in accordance with the following table:

<i>Number of Engines Tested</i>	<i>Decide "Fail" If "U" is greater than or equal to</i>	<i>Decide "Pass" If "U" is less than or equal to</i>
5	2.18	-0.13
10	2.11	0.51
15	2.18	0.88
20	2.29	1.16

where:

$$U = \frac{\sum_{i=1}^n (x_i - \mu_o)}{n (\sum_{i=1}^n (x_i - \mu_o))^0.5}$$

x_i = the projected emissions of one pollutant for the i th engine tested.

μ_o = the applicable model year emission standard for that pollutant.

n = the number of engines tested.

(B) The Executive Officer shall find that a group of engines has failed the compliance testing pursuant to the above table if he or she finds that the average emissions of the engines within the selected engine family group or subgroup exceed the applicable model year new engine emission standard for at least one pollutant.

(C) If no decision can be reached after 20 engines have been tested, the Executive Officer shall not make a "Fail" decision for the selected engine family group or subgroup on the basis of these 20 tests alone. Under these circumstances the Executive Officer shall elect to test 10 additional engines. If the average emissions from the 30 engines tested exceed any one of the exhaust emission standards for which a "Pass" decision has not been previously made, the Executive Officer shall render a "Fail" decision.

(10) Alternate Sampling Plan for Low Volume Engine Family Groups.

Any manufacturer subject to new engine compliance testing on an engine family group with a sales volume of less than 2000 engines per year may use the alternative sampling and testing schedule below.

<i>Number of Engines Tested</i>	<i>Decide "Fail" If number of failed engines is greater than or equal to</i>	<i>Decide "Pass" If number of failed engines is less than or equal to</i>
1	No Failure Decision	No Passing Decision
2	No Failure Decision	0

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3	3	0
4	4	1
5	4	1
6	5	2
7	5	2
8	6	3
9	6	4
10	6	5

(11) If the Executive Officer determines, in accordance with the procedures set forth herein, that an engine family group, engine family, or any subgroup within an engine family exceeds the emission standards for one or more pollutants, the manufacturer may be subject to being enjoined from any further sales of such products in the State of California pursuant to Section 43017 of the Health and Safety Code. Prior to seeking to enjoin a manufacturer, the Executive Officer shall consider quality audit test results, if any, and any additional test data or any other information provided by the manufacturers.

(12) Engines selected for inspection shall be checked to verify the presence of those emissions-related components specified in the manufacturer's application for certification, and for the accuracy of any adjustments, part numbers and labels specified in that application. If any engine selected for inspection fails to conform to any applicable law in Part 5 (commencing with Section 43000) of Division 26 of the Health and Safety Code, or any regulation adopted by the state board pursuant thereto, other than an emissions standard applied to new engines to determine "certification" as specified in Chapter 9, the Executive Officer shall notify the manufacturer and may seek to enjoin the manufacturer from any further sales of such products in the State of California pursuant to Section 43017 of the Health and Safety Code. Prior to seeking to enjoin a manufacturer, the Executive Officer shall consider any information provided by the manufacturer.

(b) *Quality-Audit Test Procedures.*

(1) The 1996-1999 model year heavy-duty off-road compression-ignition engines certified for sale in California shall be subject to the Quality-Audit requirements specified herein. Each manufacturer shall use the quality-audit test procedures specified herein.

(2) These procedures specify the quality-audit test procedures in conjunction with the 1996-1999 Heavy-Duty Test Procedures. An engine is in compliance with these quality-audit standards and test procedures only when all portions of these quality-audit test procedures are fulfilled.

(3) Air Resources Board (ARB) personnel and mobile laboratories shall have access to engine or equipment assembly plants, distribution facilities, and test facilities for the purpose of engine selection, testing, and observation. Scheduling of access shall be arranged with the designated manufacturer's representative and shall not unreasonably disturb normal operations (See Section 6 of the 1996-1999 Heavy-Duty Test Procedures).

(4) *Applicability.*

These procedures shall apply to all certified 1996-1999 model year heavy-duty off-road compression-ignition engine family groups.

If a manufacturer cannot provide actual California sales data, it shall provide its total production and an estimate of California sales. The manufacturer shall also provide supporting material for its estimate.

(5) *Engine Sample Selection.*

For each engine family group with California sales volumes of 150 units or more per year, the manufacturer shall select for quality audit testing a representative sample of three engines or one percent of production, whichever is greater, from the highest sales volume engine family within the entire engine family group. For engine family groups with California sales volumes of less than 150 units per year, no testing shall be required unless requested by the Executive Officer based upon information and belief that such engine family groups are in noncompliance with applicable regulations. Each selected engine for quality-audit testing must pass the inspection test, by being equipped with the appropriate emission control systems certified by the ARB. The procedure for selecting engines must be submitted to the Chief, Mobile Source Division, 9528 Telstar Avenue, El Monte, CA 91731, prior to the start of production for the 1996 model year.

(6) *Engine Preparation and Preconditioning.*

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(A) The engine shall be tested after the manufacturer has determined that the emissions have stabilized. Engine manufacturers shall report the break-in schedule used on each test engine.

The manufacturer shall submit to the Executive Officer the schedule for hours of use accumulation or engine run-in and any changes to the schedule with each quarterly report.

(B) If an engine is shipped to a remote facility for quality-audit testing, and adjustment or repair is necessary because of such shipment, the manufacturer shall perform the necessary adjustments or repairs only after the initial test of the engine. Exceptions are allowed in the cases where the damage results in the engine being unsafe to operate, inoperable, or unable to complete the emission test. Additionally, an exception is allowed if the damage results in engine performance deficiencies which would be obvious in customer service and which would cause the customer to seek repair of the engine.

Manufacturers shall report to the Executive Officer in the quarterly report, all adjustments or repairs performed on engines prior to each test. In the event a retest is performed, an application may be made to the Executive Officer, within ten days of the emission test, for permission to substitute the after-repair test results for the original test results. When requested by the manufacturer, the Executive Officer will either affirm or deny the application within ten working days from receipt of the request.

(C) If a manufacturer determines that the emission test results of an engine are invalid, the engine must be retested. Emission results from all tests shall be reported. The manufacturer shall include a detailed report on the reasons for each invalidated test in the quarterly report.

(7) Quality-Audit Engine Selection Criteria.

(A) Engines shall be representatively selected.

(B) At the end of each calendar quarter, all of the data accumulated during the quarter shall be reported to the Executive Officer. Upon accumulation of sufficient data, the compliance of the engine family group with the emission standards is determined.

(8) Standards and Test Procedures; Evaluation.

The exhaust sampling and analytical procedures shall be those described in the 1996-1999 Heavy-Duty Test Procedures. An engine family group is considered to have failed the quality audit test if the average emissions do not comply with the applicable certification standards. Any corrective action to bring the engines into compliance with the standards must be applied to all engines in the engine family group reasonably expected to be in noncompliance based on the audit data and other relevant information.

(9) Reports.

Each engine manufacturer shall submit a report to the ARB within 45 calendar days of the end of each calendar quarter and of the model year. More frequent reports may be required if the Executive Officer invokes this section at the end of each month. Each engine manufacturer shall review the test results of each engine family group at the end of each month. The quarterly report shall include the following:

(A) The total production and sample size for each engine family group.

(B) A description of each test engine (i.e., date of test, engine family group, engine size, engine identification number, fuel system, engine code or calibration number, and test location).

(C) The break-in schedule used on each test engine.

(D) The exhaust emission data for HC, CO, NO_x, and PM for each test engine.

The data reported shall be rounded to one significant figure beyond the number of significant figures in the applicable standard as follows for all engines:

HC	CO	NO _x	PM
.XX	.XX	.XX	.XXX

(E) The retest emissions data, as described in paragraph (b)(6)(C) above for any engine failing the initial test, and description of the corrective measures taken, including specific components replaced or adjusted.

(F) A statistical analysis of the quality-audit test results stating:

1. Number of engines tested.

2. Average emissions and standard deviations of the sample for HC, CO, NO_x, and PM.

(G) All aborted test data and reasons for any aborted tests.

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(10) When assembly-line engines exceed an emission standard, as set forth herein, or when data submitted by the manufacturer indicates that assembly-line quality-audit testing is being improperly performed, the manufacturer may be subject to being enjoined from any further sales of such products in the State of California pursuant to Section 43017 of the Health and Safety Code. Prior to seeking to enjoin a manufacturer, the Executive Officer shall consider any information provided by the manufacturer, including any corrective action to the noncomplying engine family group. Enforcement penalties shall be imposed only for egregious violations (e.g., those situations where emissions from a few engines significantly exceed emission standards, or where the number of engines exceeding the emissions standards are significant).

(c) Selective Enforcement Audit.

(1) The 2000 and later model year off-road compression-ignition engines certified for sale in California shall be subject to the Selective Enforcement Audit requirements specified in Subpart F of the 2000 and Later Test Procedures.

(2) These procedures specify the Selective Enforcement Audit test procedures in conjunction with the 2000 and Later Test Procedures. An engine is in compliance with these Selective Enforcement Audit standards and test procedures only when all portions of these Selective Enforcement Audit test procedures are fulfilled. (3) Air Resources Board (ARB) personnel and mobile laboratories shall have access to engine or equipment assembly plants, distribution facilities, and test facilities for the purpose of engine selection, testing, and observation. Scheduling of access shall be arranged with the designated manufacturer's representative and shall not unreasonably disturb normal operations.

(d) Any manufacturer obtaining certification under this part shall supply to the Executive Officer, upon request, a reasonable number of production engines selected by the Executive Officer which are representative of the engines, emission control systems, fuel systems, and transmissions offered and typical of production models available for sale under the certificate. These engines shall be supplied for testing at such time and place and for such reasonable periods as the Executive Officer may require. Heavy-duty engines supplied under this paragraph may be required to be mounted in chassis and appropriately equipped for operation on a chassis dynamometer.

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102, 43104 and 43105, Health and Safety Code. Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104 and 43210-43212, Health and Safety Code.

REFERENCE